VALIANT COMMUNICATIONS

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VCL-ETH-E1
Ethernet over E1 Converter

Data Sheet & User Manual

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Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the buyer. The buyer-supplied firmware or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product or improper site preparation or maintenance.

Exclusive Remedies

The remedies provided herein are the buyer's sole and exclusive remedies. Valiant shall not be liable for any direct, indirect, special, incidental or consequential damages, whether based on contract or any legal theory.

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Safety Warnings

The exclamation point within a triangle is intended to warn the operator or service personnel of operation and maintenance factors relating to the product and its operating environment, which could pose a safety hazard.

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this instrument. No adjustment, maintenance or repairs should be performed by either the operator or the user.

QUALITY ASSURANCE PROGRAM

Valiant's products are designed and manufactured under a strict Quality Assurance Program based on the ISO 9001:2008 philosophy and principles. Valiant pays very special attention to its vendor development program which ensures an "end-product" of the highest quality at the most cost effective prices.

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Product Overview

The VCL-ETH-E1 Interface Converter (Desktop Version) provides the user with Ethernet over E1 conversion enabling the user to transport Ethernet data over an E1 link.

The equipment can be installed and used in pairs, with one terminal being installed at either end of the network. This equipment can also be used with VCL-ETH-8-ML and VCL-ETH-16-ML (8E1/16E1 ponit-to-point IP over TDM product) to meet various application requirements.

The VCL-ETH-E1 Interface Converter is an Ethernet extension device utilizing TDM telecom infrastructure (the telecom network of E1s, or of PDH, SDH and E1/E3/SDH microwave etc. carrying E1s). It converts the Ethernet data into E1 frame format for transmission over the existing TDM (E1) links and then re-converts the E1 back into Ethernet data the far-end terminal, to BRIDGE two Ethernet LANs over the existing E1-based telecom network. The device can effectively utilize the redundant bandwidth of telecom operators' existing TDM network to transport Ethernet data with low investment.

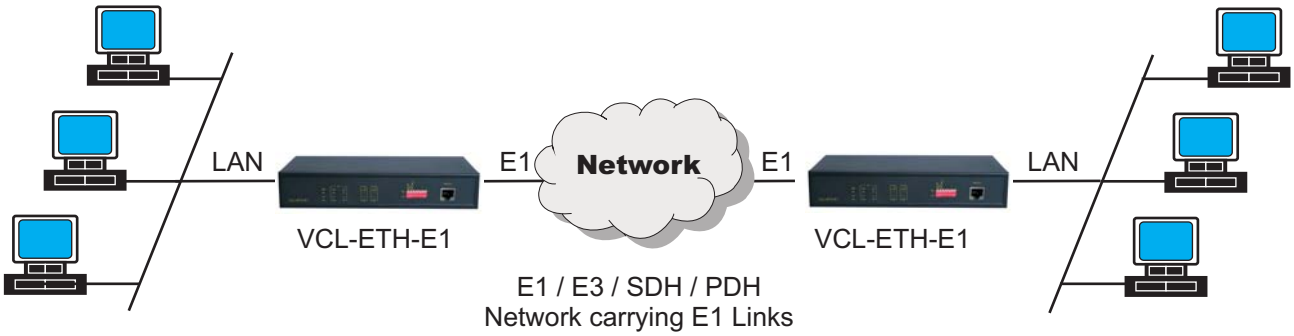
Application

The equipment may be used for the following purposes:

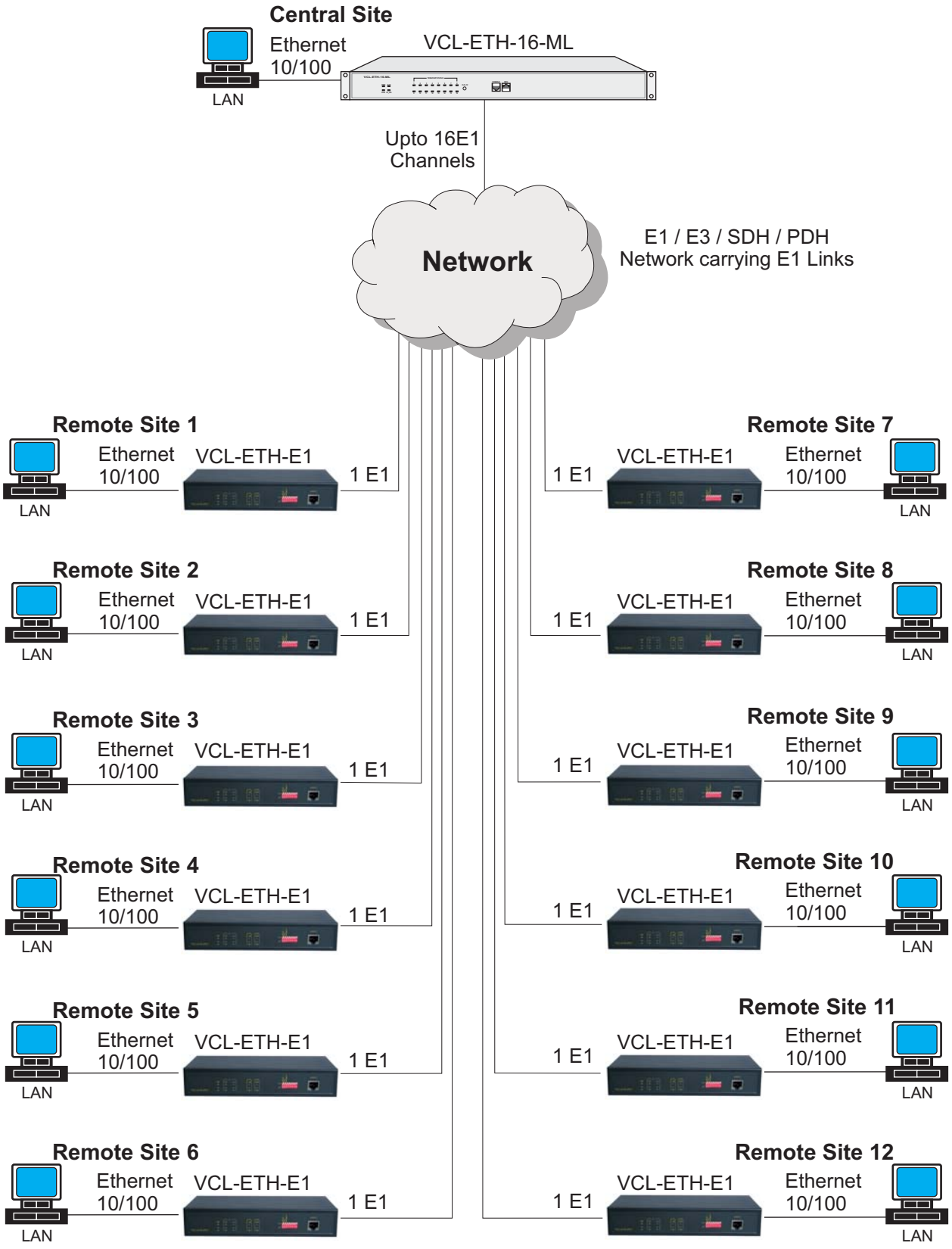
- Bridging Ethernet LANs over existing TDM (E1) telecom network.
- Extending Ethernet networks utilizing TDM (E1) landline based telecom infrastructure.
- Using telecom network of E1s/PDH/SDH microwave etc. carrying E1s to transport Ethernet data.

Typical Applications

Point to Point Application



Point to Multi-Point Application with VCL-ETH-8-ML or VCL-ETH-16-ML



Up to 12 Remote Sites / Directions and 16 E1 Links

Technical Features

- 1U high compact size
- The maximum transmission rate of Ethernet data over E1 links is 2.048Mbit/s
- E1 supports three working modes unframed, framed (CCS/PCM 31) and multiple framed (CAS/PCM30)
- Allows transparent transmission of super-long frames upto 2024 bytes
- Automatic discards under size (less than 64 bytes) and oversize (more than 2024 bytes) framed
- Ethernet interface complies to IEEE 802.3
- Automatic Ethernet negotiation function. Supports 10M/100M and working modes of both full-duplex and half-duplex
- Automatic straight and cross-over cable support (Auto-MDI/X)
- Available with MAC address list filtration, learning, and updating functions
- PAUSE flow control ability in full duplex mode
- Equipment supports two working modes of internal clock and network Loop-timed clock
- With multiple loopback functions and built-in bit error testing function, it facilitates the trouble shooting
- Compatible to deluxe models (VCL-ETH-4/8/16 and VCL-ETH-8/16-ML) and can be installed with them to reduce the installation cost
- Easy to operate
- Power supply options:
  - 220V AC (50/60 Hz) power options available
  - -48V DC power option available
- Power consumption less than 4Watts.

Alarms and Indicator Monitoring

- Power Indicator
- Remote Alarm Indicator
- Loss of Frame Indicator
- E1 LOS Alarm Indicator
- AIS Alarm Indicator
- Code Violation Alarm Indicator
- Ethernet Link Indicator
- Ethernet Mode (FDX) Indicator
- Loopback Indicator
- Error in Test Indicator.

E1 Interface Specifications

Line Rate	E1 (2.048 Mbps ± 50 bps)
Framing	Un-Framed /PCM 30 /PCM 31
Electrical	As per ITU-T G.703 and ITU-T G.704
Jitter	As per ITU-T G.742 and ITU-T G.823
Impedance	120 Ohm (RJ-45), 75 Ohm (BNC) Optional

Ethernet Port Specifications

Interface Types	10/100BaseT
Standards Compliance	IEEE 802.3
Connectors	RJ-45 (10/100 BaseT Electrical)
MDI-X	Supported (auto adapts cross-straight cable)
Mode	Autonegotiation (Half/Full - 10/100M)

Clock

Internal (Master) and network (Slave) clock.

Encapsulation

HDLC	HDLC mode is required in installation between two VCL-ETH-E1 (point to point protocol) if fractional E1 is used to carry payload
GFP	GFP Mode is must, to use the VCL-ETH-E1 in point to multi-point Protocol with Deluxe models (VCL-ETH-4/8/16 and VCL-ETH-8/16-ML)

Installation and Commissioning

Qualifying the Network

- Please ensure that the error code rate each of the E1 circuits connecting to the equipment is lower than $10^{-7.}$
- The transmission time delay difference between the various E1 circuits shall not exceed 8ms.
- The Ethernet wire type shall be, crossover when connecting with PC, and straight through when connecting to an Ethernet switch/HUB. The length of the Ethernet cable shall not exceed 100m.

Grounding

- When the device is used with the AC~220V power supply, the 3-core socket must be grounded for protection.
- The other equipment connected with the converter shall also be grounded to earth for protection.

Installation

Step 1: Power up the equipment. Please ensure that equipment is powered-up prior to connecting the Ethernet and the E1 links.

Step 2: Connect E1 line on the premise that transmission device, interface converter and Ethernet converter have safely grounded.

BER test may be conducted on each E1 link using a BERT tester to ensure that the E1 errors are within the permitted limits / threshold.

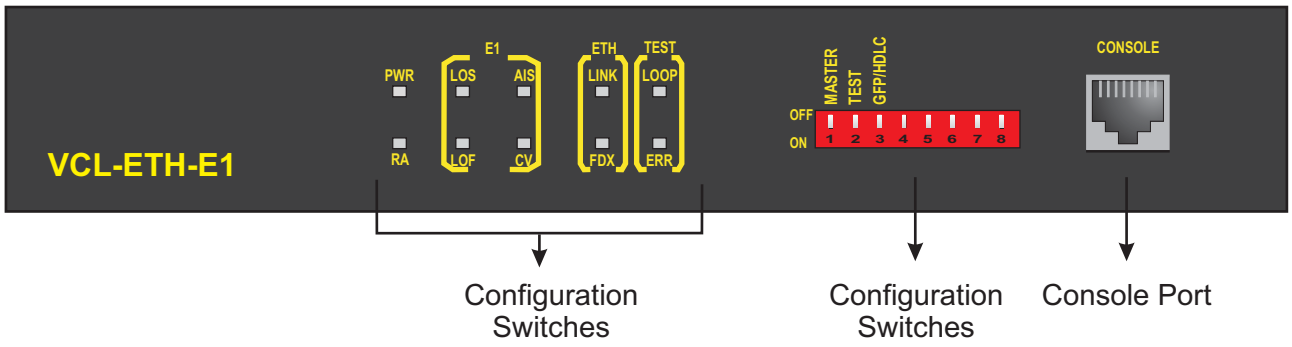
Step 3: Please configure the Ethernet mode of the Ethernet over E1 equipment at both sides as well as the Ethernet interfaces of the devices that are connected to the Ethernet over E1 equipment. Connect the ethernet links.

The equipment is used to bridge two LANs. Please ensure that the LANs on both sides of the link are operating in the same IP domain.

Step 4: Ping over the Ethernet connection from one side to the other (near-end to the far-end) to verify that the Ethernet connection has been established between the two LANs.

After succeeding in "ping", the user may also check the integrity of each E1 link by connecting E1 link and then transporting Ethernet data over that E1 link. In the event that the equipment resets repeatedly or lots of frame errors are noticed, recheck the connection between E1 cable and interface converter, or E1 cable and transmission device.

Description of the Front Panel

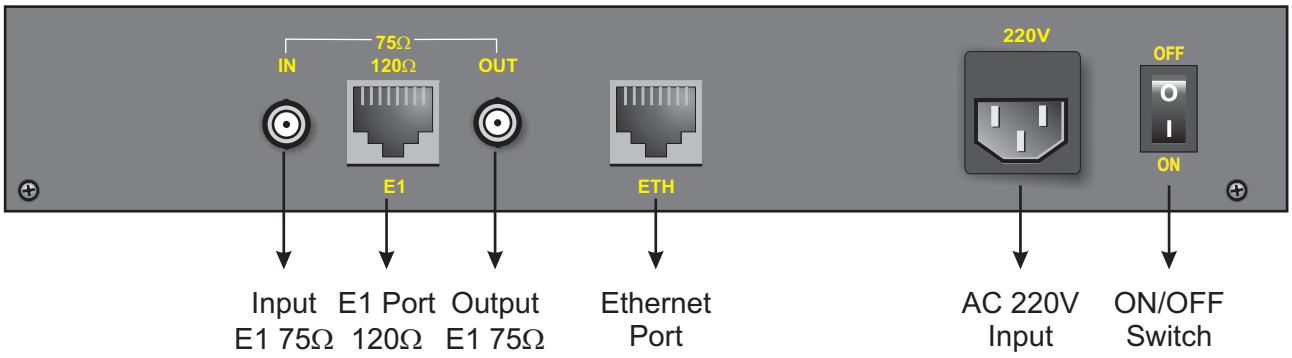


Definition of Indicators on Front Panel

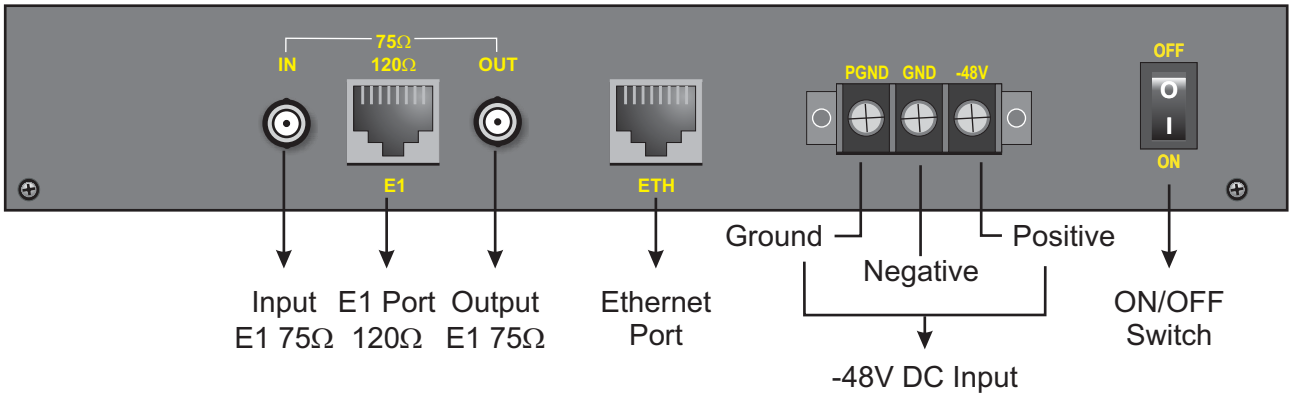
LED	Status	Description
PWR	ON	**Green**, system is powered
	OFF	System is not powered
RA	ON	**Red**, remote alarm indication
	OFF	OK
LOS	ON	**Red**, Loss of E1 alarm indication
	OFF	OK
LOF	ON	**Red**, Loss of E1 frame indication
	OFF	OK
AIS	ON	**Red**, AIS alarm idication
	OFF	OK
CV	ON	**Red**, E1 code violation alarm indication
	OFF	OK
LINK	ON	**Green**, LAN port connection Normal
	OFF	No LAN connection on Ethernet port
FDX	ON	**Green**, Ethernet port is running in full-duplex mode
	OFF	Ethernet port is running in half-duplex mode
LOOP	ON	**Yellow**, system is in test mode
	OFF	Normal operation mode
ERR	ON	**Red**, Error in BER test E1 Signal
	OFF	BER test OFF or has no errors

Switch	Status	Description
MASTER	ON	Local timing
	OFF	Tracing E1 line
TEST	ON	Line error testing, Led “ERR” show the testing result
	OFF	Turn off line error test function
GFP/HDLC	ON	HDLC framing
	OFF	GFP framing
Other	Unused	Factory use only / Unused for the users

Back View with 220V AC Power Input



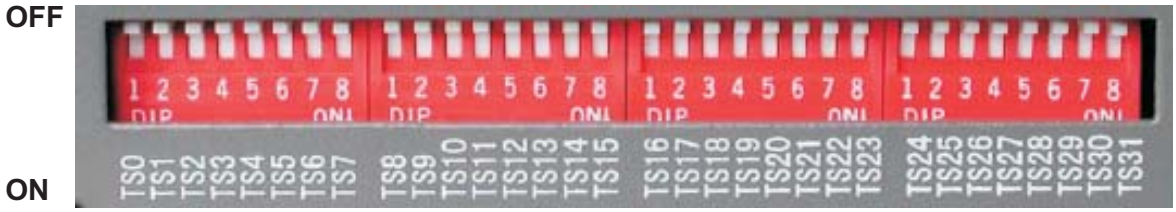
Back View with 48V DC Power Input



Tag	Description
IN 75Ω	Represents the unbalanced E1 75Ω input (BNC)
OUT 75Ω	Represents the unbalanced E1 75Ω output (BNC)
120Ω	Represents the balanced E1 120Ω input/output (RJ-45)
ETH	Fast Ethernet interface (RJ-45)
220V	Represents AC 220V input
-48V	Represents DC 48V input

E1 Bandwidth Selection

Fractional E1 bandwidth selection is effective only if the encapsulation mode is set to 'HDLC' (i.e. GFP / HDLC switch is set to 'ON').
The DIP switches for the bandwidth selection are given in the right side-bar of the equipment and the setting are as follows:


OFF
ON
1 2 3 4 5 6 7 8
DIP
ON
TS0 TS1 TS2 TS3 TS4 TS5 TS6 TS7 TS8 TS9 TS10 TS11 TS12 TS13 TS14 TS15 TS16 TS17 TS18 TS19 TS20 TS21 TS22 TS23 TS24 TS25 TS26 TS27 TS28 TS29 TS30 TS31

Working Mode	Switch Setting		
	TS0	TS1-15, 17-31	TS16
Unframed / PCM 31	ON	ON	ON
Framed (CCS) / PSM 31	OFF	Occupied timeslot ON	
Multi Framed (CAS) / PCM 30	OFF	Occupied timeslot ON	OFF

Note: Fraction E1 bandwidth is effective only if the encapsulation mode is set to ‘HDLC’. GFP/HDLC switch is set to ‘ON’

Example 1: If you wish to use only first five time slots then you need to set the TS0 time slots to OFF and switch TS1 to TS5 to ON and time slot TS16 will be set to ON.

Example 2: If you wish to carry first eight time slots on 512Kbps, then you need to set the TS0 time slot OFF and switch TS1 to TS8 to ON (i.e. since each time slot consumes 64Kbps, so 8 time slots will consume 8 x 64Kbps = 512Kbps) and time slot S16 will be set to ON.

Example 3: If you wish to carry twenty time slots on 1.28Mbps (64Kbps x 20) then you need to set time slot TS0 OFF and TS1 to TS21 time slots to ON. Please remember that the time slot TS16 will be used as signaling time slot.

Pinout Details

Console (RJ-45) Pinout Details

PIN No.	Definition of function	Signal Direction
6	GND	Signal Ground
7	RX (received data)	RS232 Signal Input
8	TX (transmitted data)	RS232 Signal Output
Others	NC	

Hyper Terminal settings

PIN No.	Definition of function	Signal Direction
1	Bits per second	19200
2	Data bits	8
3	Parity	None
4	Stop bits	1
5	Flow control	None

E1 120Ω (RJ-45) Pinout Details

PIN No.	Definition of function	Signal Direction
1	TX+ (transmitted data +)	E1 Data Output
2	TX- (transmitted data -)	E1 Data Output
4	RX+ (received data +)	E1 Data Input
5	RX- (received data -)	E1 Data Input
Others	NC	

Ethernet (RJ-45) Pinouts

PIN No.	Definition of function	Signal Direction
1	TX+ (transmitted data +)	Data Output
2	TX- (transmitted data -)	Data Output
3	RX+ (received data +)	Data Input
6	RX- (received data -)	Data Input
Others	NC	

CLI Command Help

After entering into the application program for CLI command, please key "?" in the command line to get the list of the commands.

VCL>?

Command	Description
?/help	To get a list of the commands for the system.
showversion	View software and hardware version.
showe1alarm	View E1 alarm.
seteth	Configure the Ethernet port Speed, Mode, Auto Negotiation.
showeth	View Ethernet port status.
showframe	View framing status.
showclock	View E1 clock mode.
showencapmode	View encapulation mode.
setgfp	Configure PFI, EXI, PSCRD and HSCRD of GFP.
showgfp	View PFI, EXI, PSCRD and HSCRD of GFP.

More help for a particular CLI command

For detailed command format, please key "? cmdname" or "help cmdname".

VCL>**? [cmdname]** {enter}
OR
VCL>**help [cmdname]** {enter}

Exercise:

VCL>**? showe1alarm**

Command: showe1alarm
Description: View E1 alarm.
Values: none

Detailed CLI Commands

To view system software and hardware version

Command: showversion
Descrption: View software and hardware version.
Values: none

Exercise:

VCL>**showversion**

IC version:V1.000
Hardware version:V1.12
Software version:V1.00A1

To View E1 alarm

Command: showe1alarm
Description: View E1 alarm.
Values: none

Exercise:

VCL>**showe1alarm**

ALARM	LOS	LOF	AIS	CRC
Status	0	0	0	0

Description 1: Alarm, 0: No alarm

To Configure Ethernet Port

Command: seteth <AN> <speed> <duplex> <flow>
Description: Configure the Ethernet port Speed, Mode, Auto Negotiation.
Values:
AN:<0/1>,Autotiation(0:AN not done; 1:AN done)
speed:<0/1>,(0:10Mbit/s; 1:100Mbit/s)
duplex:<0/1>,(0:half-duplex; 1:full-duplex)
flow:<0/1>,flow-control capability(0:disable; 1:enable)

Exercise:

VCL>**seteth 1 1 1 1**

AN	Speed	Duplex	Flow
Auto	100M	Full	Enable

To View Ethernet Port Status

Command: showeth
Description: View Ethernet port status.
Values: none

Exercise:

VCL>**showeth**

AN	Speed	Duplex	Flow	Status
Not Auto	10M	Half	Disable	Connected

To View Framing Status

Command: showframe
Description: View framing status.
Values: none

Exercise:

VCL>**showframe**

Frame status:Frame.
PCM30/31 status:PCM31

To View Synchronization Clock

Command: **showclock**
Description: View E1 clock mode.
Values: none

Exercise:

VCL>**showclock**

E1 Clock: Master

To View Encapsulation Mode

Command: **showencapmode**
Description: View encapsulation mode.
Values: none

Exercise:

VCL>**showencapmode**

The encapulation mode is:HDLC

To Configure GFP

Command: setgfp <PFI> <EXI> <PSCRD> <HSCRD>
Description: Configure PFI, EXI, PSCRD and HSCRD of GFP.
Values:
PFI: 0-1
EXI: 0-15
PSCRD: 1:enable ; 0:disable
HSCRD: 1:enable ; 0:disable

Exercise:

VCL>**setgfp 0 0 1 1**

PFI:0
EXI:0
PSCRD:Enable
HSCRD:Enable

To View GFP Configurations

Command: showgfp
Description: View the PFI, EXI, PSCRD and HSCRD of GFP.
Values: none

Exercise:

VCL>**showgfp**

PFI:0
EXI:0
PSCRD: Enable
HSCRD: Enable
GFP SYNC: Alarm

General Parameters

Power Supply

AC Mains Input	220V AC **Optional**
DC Mains Input	-48V
Power Consumption	<4 Watts

Service Conditions

Ambient temperature	0^0C ~ 50^0C
Relative humidity	90% (at 35^0C)

Dimensions

238mm x 125mm x 44mm

Weight

< 1 Kg.

Ordering Information

S.No.	Part No.	Product Description
1.	VCL-ETH-E1-AC	VCL-Ethernet over 1 E1 (IP over TDM) (10/100M over 1 E1): Interface conversion bet. G.703 E1 and each 10BaseT (Ethernet over E1 / TDM) Desktop Metal case 1U High Version (Half 19 inch) Supports : - 1 x Ethernet [100Mbps, Electrical RJ45 (F)] - 1 x E1 [120Ω RJ45 (F) / E1 75Ω BNC (F) (both options)] - 1 x 220V AC Power Supply Input - 1 x System Core Cables, Installation Accessories, Documentation, System User Manual etc (Set) *Suitable for Point-to-Point application and also works with our Point-to-Multi Point unit on other side
2.	VCL-ETH-E1-DC	VCL-Ethernet over 1 E1 (IP over TDM) (10/100M over 1 E1): Interface conversion bet. G.703 E1 and each 10BaseT (Ethernet over E1 / TDM) Desktop Metal case 1U High Version (Half 19 inch) Supports : - 1 x Ethernet [100Mbps, Electrical RJ45 (F)] - 1 x E1 [120Ω RJ45 (F) / E1 75Ω BNC (F) (both options)] - 1 x -48V DC Power Supply Input - 1 x System Core Cables, Installation Accessories, Documentation, System User Manual etc (Set) *Suitable for Point-to-Point application and also works with our Point-to-Multi Point unit on other side

Note: Operation and maintenance of network equipment require professional knowledge and experience. We recommend the equipment to be managed only by qualified technicians. Should you require technical assistance please consult the provider, or contact our SUPPORT DESK at **support@valiantcom.com**

Technical Specifications are subject to change without notice.
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